Hallucinogenic Plants: An Update for the School-Based Health Care Provider

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Hallucinogens are a group of drugs that alter an individual's perception of reality, causing one to see, hear, smell, taste, or feel something that does not exist. The synthetic compound Lysergic acid diethylamide (LSD) is the most potent, widely known and used hallucinogen (National Institute on Drug Abuse, 2001). Plants that cause hallucinogenic effects include, but are not limited to, *Lophophoria williamsii* (Peyote Cactus), *Ipomoea violacea* (Morning Glory), *Datura stramonium* (Jimson Weed), and *Salvia divinorum*. The *Psilocybe cubensis* mushroom is not a plant, but will be included in this discussion. The purpose of this article is to compare these plant hallucinogens to LSD, discuss how adolescents gain information and access to them via the Internet, and what the school nurse should do if a student is under the influence of an hallucinogen.

Hallucinogenic Plants Compared to LSD (Refer to Table One)

LSD acts by interfering with the neurotransmitter serotonin and the nerve cells at the 5HT2 receptors. Plants that have a similar action include *Psilocybe cubensis* mushroom, Peyote Cactus, and Morning Glory seeds. Jimson Weed has an anticholinergic action and *Salvia divinorum* stimulates the opiate k receptors (National Institute on Drug Abuse, 2001; Hansen & Prybys, 2006).

LSD is a Schedule I drug (high potential for abuse and no currently accepted medical use). The Peyote Cactus and the *Psilocybe cubensis* mushroom, as well as the hallucinogens they contain, are also considered Schedule I drugs. The Lysergic acid amide extracted from Morning Glory seeds is a Schedule III substance (some potential for abuse, might lead to dependence, and might have a current accepted medicinal use). The possession of Morning Glory plants or seeds is legal. Jimson Weed grows wild throughout the United States and is not illegal to possess or ingest (Drug Enforcement Administration, n.d.; Tiongson & Salen, 1998; Bucheler et al., 2005).

Salvia divinorum is not federally controlled, but is listed by the Drug Enforcement Administration (2006) as a "drug of concern." Delaware and Missouri have added it to the Schedule I drugs, and in Louisiana and Tennessee, it is illegal (Drug Enforcement Administration, 2006).

The pure crystal of LSD can be crushed and mixed with other agents to form a gelatin. The liquid can be impregnated into sugar cubes or soaked into sheets of paper. LSD is usually ingested, but can be snorted, smoked, or injected. (Hansen & Prybys, 2006; Williams & Keyes, 2001). *Psilocybe* mushrooms are ingested as a tea or mixed in with food to cover the bitter taste (National Drug Intelligence Center, 2003b). Law enforcement has reported an increase in distribution of chocolate-coated mushrooms, making them easier to distribute and less risky to ingest in public (Drug Enforcement Administration, 2003). The "crowns" or "buttons" of the slow-growing, spineless Peyote Cactus are harvested from the root and ingested fresh, dried, ground, or in a tea. Morning Glory seeds are ingested whole, crushed, germinated, or as an extract (Halpern, 2004). Jimson Weed seeds, pods, or leaves can be either smoked or ingested (Tiongson & Salen, 1998). *Salvia divinorum* can be smoked, chewed, ingested as a tea, or its liquid extract can be vaporized and inhaled (National Drug Intelligence Center, 2003b).

LSD acts primarily on emotions and sensations, but also causes sympathomimetic physiological effects (e.g., mydriasis, tachycardia, hypertension, hyperthermia, diaphoresis), which precede the hallucinogenic effects. Emotions can shift rapidly and sensations might be intense. Confusion of senses might occur in what is known as the synesthesia phenomenon when an individual is able to see sound or feel color. Tolerance to LSD develops rapidly, causing the use of higher doses to achieve the same effects, but the tolerance disappears if the use of LSD is stopped for several days. It does not appear to cause withdrawal symptoms (National Institute on Drug Abuse, 2001; Hansen & Prybys, 2006). The effects of *Psilocybe cubensis* mushrooms are similar to LSD except the hallucinations are less powerful and serious side effects are less common. Mescaline is a less potent hallucinogen than LSD, with similar hallucinogenic and physical effects; however, Peyote Cactus causes significant physical effects, including nausea and vomiting, abdominal pain, and dizziness (Hansen & Prybys, 2006). Lysergic acid amide from Morning Glory seeds is structurally close to LSD and has similar effects (Halpern, 2004). Jimson Weed contains atropine and scopolamine, which cause hallucinations, as well as other classic

Table 1. Hallucinogenic Plants Compared to LSD

Hallucinogen Plant Common Names	Hallucinogen and Action	Controlled Substance	How Used	Onset/Duration of Effects	Short-Term Effects	Long-Term Effects/Concerns
Lysergic acid diethylamide (LSD) Acid Microdots, Window Panes, Blotter Acid, Sugar, Trip, Zen	LSD 5HT2 receptors	Schedule I	Usually ingested, smoked, snorted, injected	Onset: 30 min Duration: 12 hrs	Hallucinations, Emotional shifts, synesthesia, sympathomimetic, tolerance	Psychosis, hallucinogen persisting perception disorder (HPPD), trauma, death
Psilocybe cubensis Mushrooms, Magic Mushrooms, Cubes, Mushies, Shrooms, Boomers, Liberty Caps, Psilocybes,	Psilocybin and Psilocin 5HT2 receptors	Schedule I Mushroom spores are legal	Ingested	Onset: 20 min Duration: 6 hrs	Same as LSD	Risk of consuming a poisonous mushroom
Peyote Cactus (Lophophoria williamsii) Peyote, Buttons, Mescalito	Mescaline 5HT2 receptors	Schedule I	Ingested	Peak effect: 2-4 hrs Duration: 6 hrs	Same as LSD; significant physical effects	Rare
Morning Glory See (*Ipomea violacea*) Heavenly Blue, Morning Glory, Bad Negro, Tlitlitzin	Lysergic Acid Amide (LSA)	Schedule III Plant/ seed legal	Ingested	Duration: 8 hrs	Same as LSD	Seeds coated with emetics to prevent abuse
Jimson Weed (Datura stramonium) Jamestown Weed, Stinkweed, Thorn Apple, Devil's Trumpet, Asthma Cigarettes, Locoweed	Atropine and Scopolamine Anticholinergic action	Not federally controlled	Ingested, smoked	Onset: 30-60 min Duration: 48 hrs	Hallucinations Anticholinergic	Large dose can cause death
Salvia Divinorum Salvia, Diviner's Sage, Ska Maria Pastora	Salvinorin A Opiate k receptors	Not federally controlled	Ingested, smoked, chewed, inhaled	Onset: immediate Duration: 2 hrs	Hallucinations, synesthesia, memory loss, unconsciousness	Effects of chronic use are unknown

Adapted from: National Institute on Drug Abuse, 2001; Hansen & Prybys, 2006; Williams & Keyes, 2001; National Drug Intelligence Center, 2006a, 2003b; Erowid, 2006a, 2006b, 2006c; Halpern, 2004; Tiongson & Salen, 1998.

anticholinergic effects (mydriasis, hyperthermia, dry and flushed skin, dry mouth, decreased bowel activity, and urinary retention) (Hansen & Prybys, 2006). *Salvia divinorum* causes vivid hallucinations and synesthesia. Effects of large doses include loss of short-term memory and complete loss of consciousness (National Drug Intelligence Center, 2003a).

Long-term effects that could occur from one time or chronic use of LSD include psychosis and hallucinogen persisting perception disorder (HPPD) or "flashbacks" (National Institute on Drug Abuse, 2001). Life-threatening risks include trauma while under the influence, respiratory arrest, hypertension, hyperthermia, bleeding, and coma secondary to an overdose. Large doses of Jimson Weed can cause seizures, hyperthermia, coma, and respiratory arrest (Williams & Keyes, 2001). Other concerns include the risk of consuming a poisonous mushroom when using *Psilocybe cubensis* or ingesting Morning Glory seeds that have been coated with emetics to prevent abuse (Halpern, 2004).

Internet Access and Use

Dennehy et al. (2005) found that 28 Internet sites marketed herbal dietary supplements for legal alternative "recreational use." The authors found that approximately half of the products marketed were likened to a specific illicit drug and categorized as a hallucinogen. *Salvia divinorum* is the second most

common product marketed. Many Internet sites glamorize the drug use and give extensive information, including recipes for drug production or locations and methods of obtaining drugs. Internet marketers maintain their anonymity by using chat rooms or encrypted websites (National Drug Intelligence Center, 2002). The internet not only allows intentional access, but increases the possibility that a young person can "stumble upon" this drug information as they surf. Additionally, an individual can quickly go from a legitimate resource to one of suspect information via the readily accessed links (Micke, 1996).

Considerations for the School-Based Health Care Provider

The school-based health care provider needs to be aware of how some of the plant hallucinogens are being marketed and the appeal this could have for the young individual. Young consumers might perceive hallucinogenic plants as low risk because they are "natural" and legal and choose to use them during this time of self-discovery. For example, the marketing of *Salvia divinorum* as a "tool for meditative introspection" might appeal to the adolescent for "philosophical insights" as well for a sense of belonging to an Internet salvia "community." Salvia is inexpensive, not federally controlled, and readily available through the internet (Bucheler, 2005).

Preteens and adolescents should be provided with educational experiences to help them learn how to critically evaluate internet information (Micke, 1996). The school-based health care provider is in a key position to work with students, parents, teachers, and administrators in establishing this opportunity for critical thinking.

If the school nurse suspects that a student is under the influence of a hallucinogen, the primary focus is to provide supportive management and obtain key history and assessment information. Obtain a history of the toxin used, amount, route, time of use, and any other medications taken. Assess the heart rate, blood pressure, pupils, skin, and bowel sounds to evaluate for either sympathomimetic or anticholinergic effects. This may help determine the type of hallucinogen. If the student is stable, refer him/her to the primary care provider and a mental health professional for further evaluation. If the student is agitated and/or has an elevated temperature, maintain a quiet and calm environment to prevent further agitation or hyperthermia. If the student is unstable, establish airway breathing and circulation and initiate emergency medical response. Emergency care providers will evaluate and treat the particular toxidrome, sympathomimetic symptoms and agitation with benzodiazepines. Anticholinergic symptoms can be controlled with gastric decontamination and Physostigmine. The hallucinogens reviewed in this article are not detected on routine toxicology screens (Hansen & Prybys, 2006; Tiongson & Salen, 1998).

Summary

Several plants can cause hallucinations comparable to LSD, although the actions and effects may or may not be similar. The young consumer has ready access to the plant hallucinogens through the Internet. Health care providers working with adolescents need to maintain an awareness of Internet marketing and teen access of this resource.

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